

What is claimed is:

1 1. A catalyst deterioration detecting apparatus,
2 comprising:
3 a catalyst, disposed in a path of exhaust gas emitted
4 from the engine, including ceria serving as an oxygen storage
5 agent;
6 catalyst temperature sensing means for obtaining
7 temperature of said catalyst; and
8 deterioration detecting means for detecting a degree
9 of deterioration of said catalyst if the temperature is
10 obtained by said catalyst temperature sensing means is equal
11 to or higher than an activation temperature at which said
12 catalyst is activated and is in a particular temperature range
13 causing NO_x conversion efficiency of said catalyst to decrease.

1 2. A catalyst deterioration detecting apparatus
2 according to claim 1, wherein the particular temperature range
3 causes the ceria to transform.

1 3. A catalyst deterioration detecting apparatus
2 according to claim 1, wherein the particular temperature range
3 is not lower than 600°C nor higher than 800°C.

1 4. A catalyst deterioration detecting apparatus
2 according to claim 3, wherein the particular temperature range
3 lies around 700°C.

1 5. A catalyst deterioration detecting apparatus
2 according to claim 1, wherein said catalyst temperature
3 sensing means estimates the temperature of said catalyst on
4 the basis of a running state of the engine.

1 6. A catalyst deterioration detecting apparatus
2 according to claim 1, wherein said catalyst temperature
3 sensing means estimates the temperature of said catalyst on
4 the basis of temperature of the exhaust gas that is to be
5 supplied to said catalyst.

1 7. A catalyst deterioration detecting apparatus
2 according to claim 1, wherein:

3 said deterioration detecting means includes a NOx
4 sensor, disposed downstream of said catalyst, for sensing
5 concentration of NOx included in the exhaust gas as a NOx
6 signal; and

7 said deterioration detecting means detects the degree
8 of deterioration based on the NOx signal, which is received
9 from said NOx sensor when the temperature sensed by said
10 catalyst temperature sensing means is in the particular
11 temperature range.

1 8. A catalyst deterioration detecting apparatus
2 according to claim 7, wherein said deterioration detecting
3 means detects the degree of deterioration on the basis of
4 a variation of the NOx signal.

1 9. A catalyst deterioration detecting apparatus
2 according to claim 1, wherein:

3 said deterioration detecting means includes an
4 upstream oxygen sensor and a downstream oxygen sensor,
5 respectively disposed upstream and downstream of said
6 catalyst, each of which is for sensing concentration of oxygen
7 included in the exhaust gas as an oxygen signal; and

8 said deterioration detecting means detects the degree
9 of deterioration by comparing the oxygen signals,
10 respectively received from said upstream and said downstream
11 oxygen sensors when the temperature sensed by said catalyst
12 temperature sensing means is in the particular temperature
13 range.

1 10. A catalyst deterioration detecting apparatus
2 according to claim 9, wherein said deterioration detecting
3 means detects the degree of deterioration by comparing the
4 oxygen signals in terms of one of frequency, inversion cycle
5 and amplitude.

1 11. A catalyst deterioration detecting apparatus
2 according to claim 1, wherein:

3 said deterioration detecting means includes an oxygen
4 sensor, disposed downstream of said catalyst, for sensing
5 concentration of oxygen included in the exhaust gas as an
6 oxygen signal; and

7 said deterioration detecting means detects the degree

8 of deterioration by comparing an air/fuel-ratio variation
9 signal, which concerns an air-fuel ratio forcefully varied
10 when the obtained temperature is in the particular temperature
11 range, and the oxygen signal.

1 12. A catalyst deterioration detecting apparatus
2 according to claim 11, wherein said deterioration detecting
3 means detects the degree of deterioration by comparing the
4 air/fuel-ratio variation signal and the oxygen signal in terms
5 of one of frequency, inversion cycle, and amplitude.

1 13. A catalyst deterioration detecting apparatus
2 according to claim 1, wherein:
3 said deterioration detecting means includes an
4 upstream linear A/F sensor and a downstream linear A/F sensor,
5 respectively disposed upstream and downstream of said
6 catalyst, each of which is for sensing an air-fuel ratio of
7 the exhaust gas as an A/F signal; and
8 said deterioration detecting means detects the degree
9 of deterioration by comparing the A/F signals, respectively
10 received from said upstream and said downstream linear A/F
11 sensors when the obtained temperature is in the particular
12 temperature range.

1 14. A catalyst deterioration detecting apparatus
2 according to claim 13, wherein said deterioration detecting
3 means detects the degree of deterioration by comparing the

4 A/F signals in terms of one of frequency, inversion cycle,
5 and amplitude.

1 15. A catalyst deterioration detecting apparatus
2 according to claim 1, wherein:

3 said deterioration detecting means includes a linear
4 A/F sensor, disposed downstream of said catalyst, for sensing
5 an air-fuel ratio of the exhaust gas as A/F signal; and

6 said deterioration detecting means detects the degree
7 of deterioration by comparing an air/fuel-ratio variation
8 signal, which concerns an air-fuel ratio forcefully varied
9 when the obtained temperature is in the particular temperature
10 range, and the A/F signal.

1 16. A catalyst deterioration detecting apparatus
2 according to claim 15, wherein said deterioration detecting
3 means detects the degree of deterioration by comparing the
4 air/fuel-ratio variation signal and the A/F signal in terms
5 of one of frequency, inversion cycle, and amplitude.

1 17. A catalyst deterioration detecting apparatus,
2 comprising:

3 a catalyst, disposed in a path of exhaust gas emitted
4 from the engine, including ceria serving as an oxygen storage
5 agent ;

6 catalyst temperature sensing means for sensing
7 temperature of said catalyst; and

8 deterioration detecting means for detecting a degree
9 of deterioration of said catalyst if the temperature obtained
10 by said catalyst temperature sensing means is equal to or
11 higher than an activation temperature at which said catalyst
12 is activated and is in a particular temperature range causing
13 the ceria to transform.

1 18. A catalyst deterioration detecting apparatus,
2 comprising:

3 a catalyst, disposed in a path of exhaust gas emitted
4 from the engine, including ceria serving as an oxygen storage
5 agent;

6 catalyst temperature sensing means for obtaining
7 temperature of said catalyst; and

8 deterioration detecting means for detecting a degree
9 of deterioration of said catalyst if the temperature obtained
10 by said catalyst temperature sensing means is equal to or
11 higher than an activation temperature at which said catalyst
12 is activated and is in a particular temperature range causing
13 an oxygen storage capacity of said catalyst to reduce.

1 19. A catalyst deterioration detecting apparatus,
2 comprising:

3 a catalyst, disposed in a path of exhaust gas emitted
4 from the engine, including ceria serving as an oxygen storage
5 agent;

6 catalyst temperature sensing means for sensing

7 temperature of said catalyst; and
8 deterioration detecting means for detecting a degree
9 of deterioration of said catalyst if the temperature obtained
10 by said catalyst temperature sensing means is equal to or
11 higher than an activation temperature at which said catalyst
12 is activated and is in a temperature range around 700°C.